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The Enterprise Sector and Emergence of the Polish Fiscal Crisis, 1990-91

Mark Schaffer

Increasing tax revenues from the enterprise sector alone will not solve Poland's budget crisis. As the state sector shrinks and the private sector grows, the tax net will get increasingly leaky. The budgetary problem could be ameliorated by controlling social security expenses and possibly by abolishing amortization deductions for state-owned enterprises.

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This paper — a product of the Transition and Macro-Adjustment Division, Policy Research Department — is part of a larger departmental study on Enterprise Behavior and Economic Reform in Central and Eastern Europe. Copies of this paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Emily Khine, room N11-065, extension 37471 (September 1993, 32 pages).

Schaffer analyzes the causes of the collapse of profitability in 1991 of the Polish enterprise sector. He explores how it affected the government budget and assesses the forecasts of enterprise sector performance used to prepare the government's 1990 and 1991 budgets.

Schaffer attributes about half of the drop in profitability to the decrease in the inflation rate and the consequent decrease in the inflation bias in profits that results from historical cost accounting.

He attributes most of the rest of the collapse in profitability to higher labor unit costs and higher amortization allowances. When wages are endogenized in a simple model, nearly the entire collapse of profitability is explained by the changes in inflation bias and amortization allowances.

The decrease in the inflation bias and the increase in amortization allowances caused profits, and thus profit taxes, to fall, freeing up cash that could be spent on wages, causing profits and profit taxes to fall even further. This loss in government revenue was offset by increased revenues from wage taxes, which were in turn offset by an increase in wage-indexed government spending, notably on pensions.

As a result of all these changes, the government deficit increased about 4 to 5 percent of GDP — about half of the fiscal swing between 1990 and 1991.

Policy options Schaffer recommends for increasing tax revenues include the following: (1) increasing the turnover tax and introducing the value-added tax that will replace it at rates that maintain the increased level of revenue; (2) increasing the social security tax rate; and (3) maintaining, but not raising, the historical cost-based profit tax, an automatic stabilizer.

An obvious alternative to the profit tax based on historical cost accounting is to redress a 1991 mistake, the indexing of amortization deductions. Schaffer recommends drastically reducing or even abolishing amortization deductions for state-owned enterprises for fixed capital acquired before 1990 (before the start of the transition from socialism). It is odd that these firms are given a tax break on top of the free use of state-owned capital. If anything, they should be paying for the use of the capital.

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THE ENTERPRISE SECTOR AND EMERGENCE OF THE POLISH FISCAL CRISIS 1990-91

BY MARK SCHAFFER

CONTENTS

TABLES

FIGURES

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I. INTRODUCTION

In January 1990 Poland began in earnest its transition from socialism. The first year of the Polish reform program saw a large number of surprises, some good, some bad. Prominent among the surprises was the government's success in gaining control over the fiscal deficit. Indeed, this was a case of too much of a good thing - the fiscal stance in 1990 was much tougher than planned (a general government surplus of 3% of GDP, compared with planned approximate balance), at a time when the contraction in output was much larger than anticipated. A second, related, surprise was the performance of the enterprise sector. Profits were considerably higher than anticipated, thus contributing (via the large dependence of the budget on profit tax revenue) to the fiscal surplus.

The second year of the Polish program saw some further surprises, and in particular, complete reversals with respect to both the government budget and enterprise profitability. Instead of the planned approximate budget balance, the general government deficit in 1991 amounted to over 5% of GDP; a swing of 8% of GDP from one year to the next. At the same time the profitability of the enterprise sector collapsed - from 23% (as a % of sales) in 1990 to only 7% in 1991 - and with it collapsed profit tax revenues. This year has seen a continuation of these trends; profitability continues to be very low, and the government budget deficit continues to grow.

In this paper I will analyze the relationship between enterprise sector performance and the government budget. The basic conclusions are as follows.

- First, the single largest contributor to the collapse in enterprise profitability in 1991 was a decline in the inflation rate, via a decline in the inflation bias in the (historical cost) profit figures. About half of the entire profitability drop is due to this factor alone. Most of the rest of the drop is due to increases in unit labor costs and in amortization allowances.

- Second, the increase in unit labor costs can be seen as the result primarily of the decline in the inflation bias and the increase in amortization allowances. Movements in these two items caused large drops in profits and thus in profit tax liabilities, thus (ceteris paribus) improving the net cash flow position of the enterprise sector. Workers have a dominant role in Polish enterprises, and so this additional cash was spent on wages, thus driving profits down still further. In this view, nearly the entire drop in enterprise sector profitability is the direct or indirect result of the decline in the inflation bias and (to a lesser extent) the increase in amortization allowances.

- Third, the impact of these developments on the government budget was as follows. The direct impact of the changes in the inflation bias and amortization caused profits, and thus profit taxes, to decline. The increase in unit labor costs also caused profits and profit taxes to decline, but this loss in government revenue was offset by an increase in revenues from wage taxes. However, this gain in wage tax revenues was in turn offset by an increase in wage-indexed government spending, notably pensions. The overall impact of all these changes on the budget was a loss in 1991 in net government revenue of about 4-5% of GDP, i.e. about half of the swing in fiscal stance.

The paper is organized as follows. After a brief summary of taxes paid by the enterprise sector, I discuss the problems in interpreting the statistics on enterprise sector finance and how I try to cope with them. I then analyze enterprise sector profitability, movements in wages, and the impact on the government budget. This is followed by a section which compares the Finance Ministry's forecasts of enterprise sector profit performance for 1990 and 1991 with the actual outcomes. The final section examines some revenue-enhancing options the government could consider adopting now.

II. Enterprise Finance and the Structure of the Government Budget

As in most transition economies, government revenues in Poland depend mostly on taxation of the enterprise sector, which in turn is dominated by state-owned enterprises. In this section I will briefly describe the main sources of tax revenue deriving from the enterprise sector. The data exclude the private sector in 1988-90, and the small-firm sector in 1991.[1] For ease of exposition, I will normalize most quantities by what I will call "sales at producer prices", defined as "sales of own production" net of turnover taxes and subsidies. NB: "sales at producer prices" (as well as "sales of own production") was roughly the same magnitude as nominal GDP in 1990-91.

The main sources of revenue are as follows:

A. Turnover tax

This is a tax on enterprise sales. The rate is variable by product, with a large portion (40% in 1990) coming from taxes on just three products (alcohol, tobacco, and petroleum products). Including these items, the average rate of turnover tax in 1990-91 was 5-5.5%.[2]

B. Profit tax (lit. "income tax")

This a fixed-rate tax on enterprise profits. Profit ("wynik finansowy", lit. "financial result") is defined in terms of historical costs, net of turnover tax, subsidies, and depreciation allowances. The statutory rate was lowered to 40% in 1989 in conjunction with the introduction of the so-called "dividend tax". The average rate of profit tax for profit-makers (tax due as a percentage of profit) in 1990-91 was about 37%. Profit tax due was about 8-9% of sales in 1990 and fell sharply (together with profits) to 4-5% in 1991.

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1. Firms with fifty or fewer employees in industry and construction, twenty or fewer in other sectors, are not covered in the 1991 data. Data for 1988-90 cover the "socialized sector" only, i.e. the state and cooperative sectors.

2. Turnover tax revenues as a percentage of "sales of own production".

C. The "dividend"

This tax was introduced in 1989. It is a tax based on that portion of the enterprise's capital that was centrally-financed ("fundusz założycielski", lit. "founder's fund"). It was introduced as a socialist attempt to mimic capitalist dividend payments (hence the name) and is paid out of profit. The dividend as a percentage of sales has been about 1-2% in recent years, but the burden of the tax varies considerably from enterprise to enterprise. There is also an entirely separate small tax on real estate, equivalent to less than 1% of sales.

D. Tax on excessive wage increases ("popiwek" or "PPWW")

This tax has been present, under a variety of names, since the early 1980s. The tax penalizes firms which pay wage bills (in 1990) or average wages (in 1991) above a certain norm. It is a tax-based incomes policy (TIP) tool, and as such was not originally intended to raise large amounts of revenue. It is paid out of profit.[3] In 1990 the popiwek applied to the entire enterprise sector; starting in 1991, it applied to the state-owned sector only. It amounted to about 2% of sales in 1990-91.

E. Payroll taxes

There were three such taxes in operation in Poland:

1. *Social security contributions*. These were paid at a statutory rate of 43% of the wage bill (raised to 45% in 1992). The average rate was about 38% in 1990-91. The revenues from this tax went to the state pension fund (ZUS) and not to the state budget.

2. *Wage taxes*. These were paid at a statutory rate of 20%; the average rate was about 19%. A portion of the revenues was used to finance local government budgets.

3. *Contributions to the "labor fund"*, a 2% payroll tax introduced in 1990 to help finance unemployment expenditures.

In 1992, as part of the personal taxation reform and the introduction of personal income tax, wage taxes were abolished and a PAYE (pay-as-you-earn) taxation system was introduced at the enterprise level.

Table 1 summarizes the magnitudes of these taxes, along with other key data. The role of the enterprise sector in the development in the fiscal crisis is not immediately apparent; profit tax revenues collapsed in 1991, but much of this was offset by an increase in other taxes, notably wage-related taxes. I begin the analysis with profits and profit taxes. The collapse in profit tax revenues was caused by the collapse in enterprise profits; but the explanation of why profits collapsed is much less straightforward.

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3. In some statistical sources it is included as part of profit tax in 1989 only.

Table 1: Taxes paid by the enterprise sector (as a percentage of sales at producer prices)

	1988	1989	1990	1991
Turnover tax	7.1	6.8	5.0	5.6
Profit tax	7.9	8.8	8.4	4.5
Dividend		1.4	1.8	1.7
TIP	0.5	1.8	2.0	2.8
Payroll taxes	6.7*	7.2*	6.6	8.5
of which				
Wage taxes	2.2	2.5	2.1	2.7
Social security and labor fund	4.4*	4.7*	4.5	5.8
Real estate tax	0.5	0.2	0.4	0.8
All taxes above	22.6	26.2	24.2	24.0
Net indirect taxes (turnover tax minus subsidies)	-0.3	-0.7	1.1	2.9
Memorandum items:				
Sales of own production (bn zł)	48541	153768	805397	1001933
" at "producer prices" (bn zł)	48704	154874	796845	974137
Nominal GDP (bn zł)	29629	118319	606726	940300
General government surplus/deficit as % of GDP	0.0	-6.0	3.1	-5.3
Industrial price index inflation (% increase, December-December)	75.5	653.0	192.9	35.7

* Estimate

III. Making Sense of Polish Profits

The main problem with interpreting the published data[4] on enterprise profits is that historical cost accounts (HCA) suffer from an inflation bias, and during the period in question inflation in Poland rapidly accelerated and then decelerated (Table 1). The inflation bias results from the lag between the time at which an input is purchased and the time at which the output that embodies the input is sold. If the price level increases during this period, the product will look like it generated large profits for the enterprise - input costs were low relative to the selling price - but this is an illusion. These are just "paper profits",

4. The main source of data on the enterprise sector used in this paper is the Polish Central Statistical Office. These data are supplemented with data from the Ministry of Finance.

since if the firm is to continue as a going concern, the inputs that are used up must be replaced at the current, higher, price level.

Not subject to this inflation bias are profits expressed on a cash flow (CF) basis, in which an input is counted as a cost when the expenditure on the input takes place. Approximate cash flow for the enterprise sector can be derived from the published historical cost accounts, inventory data, and an accounting identity; see the Appendix for details and some worked-out examples.[5] The intuition behind the calculation is that the while inflation biases historical material costs downwards, it simultaneously biases nominal inventory accumulation upwards, and these biases are identically equal (except for the sign).

The result of applying this calculation is a series which I shall call, with some abuse of terminology, "cash flow".[6] It differs from the standard HCA profit series ("wynik finansowy", the profit tax base) in three ways:

1. The "cash flow" series does not suffer from an inflation bias. Everything is in current terms.

2. Real inventory accumulation (decumulation) will decrease (increase) cash flow but will have no effect on HCA profits.

3. As is standard with cash flow figures, amortization deductions have been added back in.

Everything else counted as a cost or a revenue (e.g. interest charges, wages, financial incomes of all sorts) in HCA profits is also counted in the cash flow series.

Figure 1 shows the results of applying this adjustment to profits in the Polish enterprise sector. The difference between the HCA and cash flow series is dramatic. HCA profitability (profits as a percent of sales at producer prices) was very high in 1989 and 1990, and collapsed in 1991. Cash flow profitability, by contrast, shows a much smaller drop in 1991.

Another useful and inflation-bias-free measure of profit is profit calculated on a current-cost-accounting (CCA) basis. This is similar to HCA profit except that it uses current prices of inputs instead of the (historical) prices actually paid. The differences between CCA profit and cash flow are:

1. Real accumulation (decumulation) of inventories decreases (increases) cash flow but has no effect on CCA profit.
2. Again, cash flow is gross of depreciation and CCA profit is net. CCA profit measures the profitability of production, whereas cash flow measures the cash earned by the enterprise.

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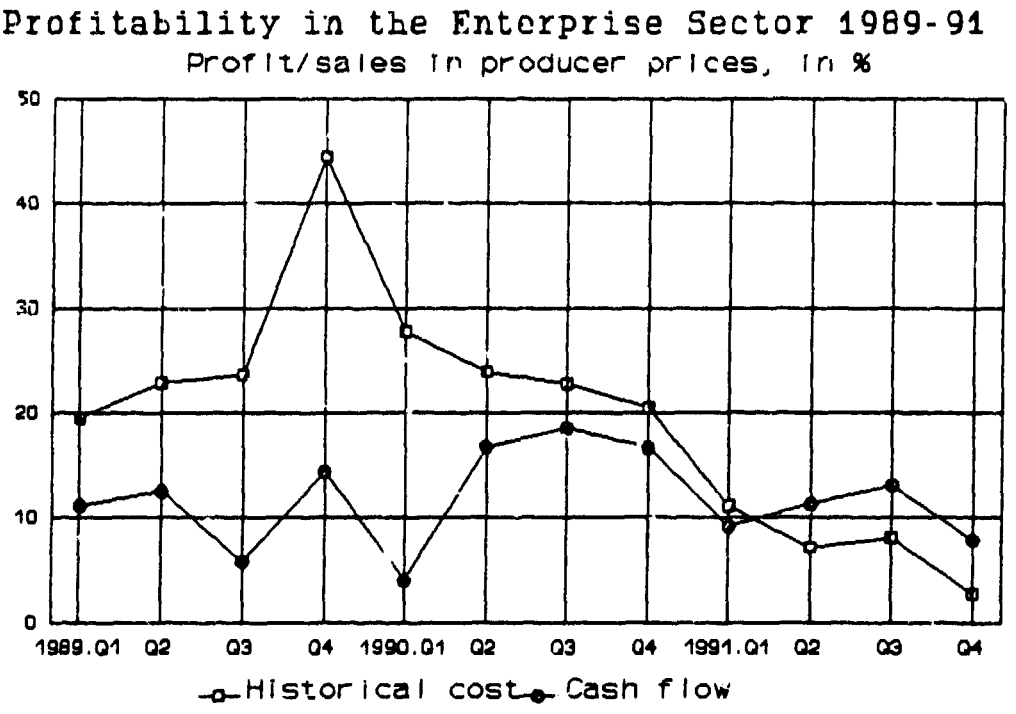
5. I should note that the method of calculating cash flow is correct in principle, but may suffer from problems in practice. It is therefore best treated as an approximation.

6. This "cash flow" series is basically "net cash flow from current operations", but with the difference that extraordinary profits and losses are included. Extraordinary profits and losses cannot be straightforwardly separated out because they include paper capital gains from explicit inventory revaluations, and these must be left in for the derivation of cash flow to work. See the Appendix.

Figure 1



The relationships between CCA profit, HCA profit, and cash flow are summarized in the following box.

Unfortunately, we have no direct data on real accumulation of inventories; this must be estimated from nominal inventory data. I do this by deflating nominal inventory data with a weighted moving average of the industrial price index. A fuller description of the method used to calculate real inventory accumulation is given in the Appendix.

The key assumption in the process is the estimate of the average life in inventory - the time between the purchase of materials and the sale of goods - in the entire Polish enterprise sector. The problem is that inflation was extremely rapid at a crucial period - late 1989 and early 1990. The estimates of real inventory accumulation for 1989 and 1990 are therefore rather sensitive to the choice of the length of the moving average.

Estimates of the average life in inventory for the entire enterprise sector, and the corresponding weighted price deflators, are derived in the Appendix. Adjustments and allowances are made for: (1) the Polish definition of sales ("sales of own production"), which understates the volume of total turnover by

CCA Profit, HCA Profit and Cash Flow

1. Standard definitions

HCA profit
- IB
= CCA profit

CCA profit
- IA
+ A
= CF

2. Gross of amortization

HCA profit (gross of amortization)
- IB
= CCA profit (gross of amortization)

CCA profit (gross of amortization)
- IA
= CF

where

HCA profit	=	Profit calculated on an historical cost accounting basis (standard profit reported in the Polish statistics)
CCA profit	=	Profit calculated on a current cost accounting basis
CF	=	Cash flow

about 50%;[7] (2) the structure of inventories (materials spend a longer time in inventory than finished goods); (3) the inflation bias in inventory valuation; and (4) the costing of inventories (they are valued at cost and not in terms of potential sales revenue). The results of the calculations suggest an average life in inventory of 1 to 3 months, with numbers towards the lower end of the spectrum perhaps more likely.

The range of estimates of real inventory accumulation presented here correspond to the range of estimated inventory life: 1-month inventory life; 2-month inventory life; and 3-month inventory life.

7. The reason is that to calculate "sales of own production" a large portion of turnover (notably in retail trade) is summed over profit margins and not gross turnover. See the Appendix.

Table 2: Real inventories in the Polish enterprise sector

	1988	1989	1990	1991
End-year inventories				
1 January 1988 = 100				
Assumed IL = 1 month	92.9	58.5	55.3	51.1
Assumed IL = 2 months	93.8	64.9	55.6	50.8
Assumed IL = 3 months	94.0	67.1	55.8	50.8
Real inventory accumulation				
as a % of start-year inventories				
Assumed IL = 1 month	-7.1	-37.0	-5.4	-10.1
Assumed IL = 2 months	-6.2	-30.8	-14.2	-11.1
Assumed IL = 3 months	-6.0	-28.7	-16.8	-11.4
IL = inventory life				
Memorandum item:				
Industrial sales growth, in %	4.9	-1.4	-25.6	-14.2
(1988-90 - not incl. private sector				
1991 - not incl. firms with < 6 employees				
Compare with note 1.)				

The estimates for real inventory accumulation are given in Table 2. As expected, the choice of deflator has the biggest effect on the estimates for 1989 and 1990. Note, however, that the year-end point estimates for 1990 and 1991 are not much affected. The picture is one of major inventory decumulation in 1989-90 and 1991; at the end of 1991, inventories amounted to about 50% of their pre-1989 level, perhaps somewhat less than the fall in enterprise sector output as captured in the statistics.[8]

The inventory accumulation and profit figures are combined in Table 3 to yield estimates of the inflation bias and of real profitability. Several checks on the consistency and plausibility of the results are given in the Appendix. An additional check is the results of Barbone (1992), who uses a different method to calculate the inflation bias for assumed inventory lives of three and six months. His estimate for three months is fairly close to the corresponding estimate presented in this paper.

8. Some of the drop may be caused by decreased coverage of the enterprise sector in 1991. See note 1.

IV. Movements in Profits 1990-91

From Table 3 we can see that HCA profitability fell by over 16% in 1991 to only 7%, CF profitability by less than 3% (to about 10%), and CCA profitability by something like 6%-8% (depending on the estimate of inventory accumulation). The task in this section is to "explain", or, more properly, "account for" these changes.

The basic data are presented in Table 3. As before, all quantities are measured as a percent of sales at producer prices.

A. The inflation bias

The first surprise is that the biggest contribution to the fall in profitability in 1991 was the decline in the inflation bias. The estimates of the inflation bias in 1990 are very large whatever the assumption made about inventory life - it added from 13% to 17% to HCA profitability that year. With the slowdown in inflation in 1991 came a sharp fall in the inflation bias to about 5-6%. The decrease in the inflation bias contributed about 8-10% to the total fall in profitability.

B. Labor costs

Unit labor costs (wages and payroll taxes as a percentage of sales at producer prices) increased substantially in 1991, and caused profitability to drop by 4-5%. The second surprise (given the attention given to the wage increase by many analysts) is therefore that the role played by unit labor costs in the profitability squeeze was secondary.

The increase in unit labor costs in 1991 was only partly the result of an ineffective incomes policy. Had the TIP held and the average wage stayed at the limit allowed by the TIP scheme, average wages would have been about 10% lower in 1991 than they actually were. This would have meant an increase in ULC to about 20%, or an increase of 2%.

How is this possible, given that the TIP scheme in 1991 limited average wage increases to 60% of the increase in the CPI and that the fall in employment was almost as large as the fall in output? The reason is that the CPI increased significantly faster than the producer price index. Average annual real consumption wages (nominal wages deflated by the CPI) were virtually the same in 1991 as in 1990, but product wages (measured as the wage deflated by the industrial price index) increased by over 10%. We can interpret the increase in unit labor costs as the result of Polish workers trying to maintain living standards at the expense of profits. For more on this in a cross-country comparative context, see Estrin, Schaffer and Singh (1992).

C. Amortization allowances

The third surprise is the large role played by amortization allowances in the profitability decline. These tax deductions increased dramatically at the start of 1991 as a result of inflation indexation, and account for 3-4% of the drop in HCA profitability.

Table 3: Profitability and the inflation bias

All quantities are measured as a percentage of sales at producer prices, except where noted.

	1988	1989	1990	1991
HCA profitability	16.9	34.9	23.6	7.1
Amortization	2.6	1.2	3.4	6.8
HCA gross of amortization	19.6	36.1	27.0	13.9
CF	10.5	12.3	13.8	10.5
ULC	19.1	21.1	18.0	22.6
IB+IA (= gross HCA - CF)	9.0	23.8	13.2	3.5
Inventory accumulation				
Assumed IL = 1 month	-1.2	-8.5	-0.4	-1.9
Assumed IL = 2 months	-1.1	-7.9	-2.1	-2.1
Assumed IL = 3 months	-1.1	-7.5	-2.7	-2.3
Inflation bias				
Assumed IL = 1 month	10.3	32.3	13.6	5.4
Assumed IL = 2 months	10.2	31.7	15.3	5.6
Assumed IL = 3 months	10.1	31.3	15.8	5.7
CCA profitability gross of amortization				
Assumed IL = 1 month	9.3	3.8	13.4	8.6
Assumed IL = 2 months	9.4	4.4	11.7	8.3
Assumed IL = 3 months	9.4	4.8	11.2	8.2
CCA profitability				
Assumed IL = 1 month	6.6	2.6	10.1	1.7
Assumed IL = 2 months	6.8	3.2	8.4	1.5
Assumed IL = 3 months	6.8	3.6	7.8	1.4
Taxation of IB as % of nominal GDP				
Assumed IL = 1 month	7.9	10.7	6.4	3.5
Assumed IL = 2 months	7.8	10.5	7.1	3.6
Assumed IL = 3 months	7.8	10.4	7.4	3.7

Amortization allowances are set by the Ministry of Finance. The drop in HCA profits caused by the increase in these allowances and the consequent drop in profit tax revenues is therefore in some sense self-inflicted. I will return to this point later in the paper.

D. Zloty appreciation

One of the reasons the CPI increased faster than the PPI in 1991 was because of the use of the exchange rate as a "nominal anchor" in macro policy. From January 1990 to May 1991 the zloty/dollar rate was fixed in nominal terms; since the domestic price level continued to increase following price liberalization this amounted to a substantial appreciation of the zloty. The zloty appreciated in real terms in 1991 by 25% compared to 1990. Furthermore, import prices increased in 1991 more than export prices.

A guesstimate of the effect of the zloty appreciation on profitability can be had as follows. Write profitability as the difference between domestic and export sales and domestic and import costs, as a percentage of total sales:

$$\frac{\pi}{S} = \frac{p^D Y^D + p^X Y^X - p^D C^D - p^I C^I}{p^D Y^D + p^X Y^X}$$

$$= \frac{Y^D + \frac{p^I}{p^D} Y^X - C^D - \frac{p^I}{p^D} C^I}{Y^D + \frac{p^I}{p^D} Y^X}$$

Take first differences holding output constant, ignore the effect of changes in relative prices on the value of total output, and we get

$$\Delta\frac{\pi}{S} = \frac{\Delta(\frac{p^X}{p^D}) Y^X - \Delta(\frac{p^I}{p^D}) C^I}{Y}$$

To get the approximate effect of the zloty devaluation on profitability, we use the following numbers:[9]

$$C^I = .75 Y^X \qquad \frac{Y^X}{Y} = .16$$

The export price index increased by 14% in 1991, and the import price index, 20%. For the domestic price level we take the price index for consumer goods (up by 60% in 1991). Plug all these numbers in and we find that, ceteris paribus, changes in relative export and import prices decreased profitability by maybe 1%-2% in 1991.

E. The cost of credit

Published enterprise sector data unfortunately do not include interest costs as a separate item for 1990. However, I have tried to estimate the scale of interest charges using NBP aggregate credit and interest rate data. The results suggest that "unit credit costs" (interest payments divided by sales) were about the same magnitude in 1990 and 1991; perhaps these costs were slightly lower in 1991. I conclude,

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9. These figures are taken from a 1988 input/output table (GUS 1990) with a 30% downwards adjustment for gross enterprise sector output.

somewhat tentatively, that there is not much of a direct role for changes in the cost of credit in explaining the 1991 profit collapse.

F. Taxes and subsidies

In Poland as in other transition countries, subsidies have been cut drastically in recent years. However, the bulk of the Polish subsidy cuts took place before January 1990. Net indirect taxes from the enterprise sector (turnover taxes minus subsidies) fell further in 1991, but the change was relatively small; net taxes as a percentage of sales went from 1.1% the previous year to 2.9% (Table 1). In any case the net effect on profits of subsidy cuts/net tax increases would depend on what happened to prices. For example, subsidy cuts could lead to higher profits if price controls are lifted and firms exercise monopoly power.

G. "Extraordinary profits and losses"

This is a mystery item in the enterprise financial accounts. It includes, for example, capital gains/losses on hard currency holdings, interest on overdue credits, capital gains on explicit inventory revaluations, etc. In 1989 it was very large (8% as a percent of sales), apparently largely because of capital gains on hard currency holdings. In 1990 it was much smaller but still positive, and in 1991 it became significantly negative. It is not clear how to interpret this, however, and more information is needed here.[10] Table 4 summarizes the above results:

Table 4: The 1991 Collapse in Profitability - Sources

Fall in HCA profitability	-16.5
Estimated effects of:	
Increase in amortization allowances	-3.5
Increase in ULC	-4.7
Decrease in inflation bias	-8 to -10
Changes in relative import/export prices	-1 to -2
Total:	-17 to -20

10. For example, as inflation declined, inventory revaluations carried out by enterprises would have resulted (c.p.) in smaller (paper) capital gains and smaller extraordinary profits. But this would not affect HCA profit over a longer period, since the effect of the revaluation would be to bring forward the inflation bias that would be realized anyway when the revalued inventories were later sold.

The actual fall in HCA profitability is very close to the lowe end of the cumulative effects of the above factors. Since the main source of uncertainty in the above estimates is the size of the change in the inflation bias, this suggests that the lower of the inflation bias estimates for 1990 may be the more accurate.

V. A Note in Passing: Inventory Accumulation in the National Accounts

The national accounts produced by the Central Statistical Office are also severely affected by an inflation bias, especially the national accounts in current prices. This can be seen from Table 5, which compares changes in stocks from the national accounts with the estimates of real inventory accumulation in the enterprise sector described above (nb: the enterprise sector accounts for the bulk of inventories in the economy).

Table 5: Inventory accumulation and the national accounts

	1988	1989	1990	1991
Own calculations:				
Inventory accumulation as a % of nominal GDP				
Assumed IL = 1 month	-1.9	-10.3	-0.5	-1.9
Assumed IL = 2 months	-1.8	-9.6	-2.6	-2.2
Assumed IL = 3 months	-1.7	-9.1	-3.3	-2.3
Inflation bias as a % of nominal GDP				
Assumed IL = 1 month	15.3	38.6	15.7	5.6
Assumed IL = 2 months	15.1	37.9	17.8	5.9
Assumed IL = 3 months	15.1	37.4	18.5	6.0
CSO national accounts data: (From Rocznik Statystyczny 1991, p. 119)				
Changes in stocks as % of nominal GDP	10.1	22.1	11.3	n.a.
Changes in stocks as % of constant price GDP	5.1	6.9	2.5	n.a.

The inflation bias in the national accounts is clearly visible: substantial increases in stocks are implausible, especially for 1989-90. How much the inflation bias amounts to would depend on precisely how GDP was calculated.

VI. Profits, Tax Revenue and Wage Behavior

In a separate paper (Schaffer 1992) I describe how, at the start of the government's stabilization/liberalization program (January 1990), the enterprise sector was hit with large profit tax liabilities resulting from the inflation bias. This fiscal crunch contributed to the decline in real wages - to come up with the money to pay their profit taxes, enterprises held down wages in order to boost cash flow - and thus to the large output fall that was observed in early 1990. Here I want to argue that the inflation bias played a critical role in both the profit collapse and the lack of wage restraint observed in 1991.

Table 6 summarizes the direct effect of changes in the inflation bias on profit tax revenues.[11] We do this by dividing profit tax liabilities of the enterprise sector according to the estimated contribution of the inflation bias to HCA profits. These estimates suggest that tax revenues from the inflation bias were very large in 1989 and 1990; about 10-11% of GDP in 1989 and 6-7% of GDP in 1990. The contribution of the inflation bias to profit tax revenues fell sharply in 1991, amounting to a loss in revenues of about 3-4% of GDP.

Table 6: Taxation of the inflation bias as a % of nominal GDP

	1988	1989	1990	1991
Assumed IL = 1 month	7.9	10.7	6.4	3.5
Assumed IL = 2 months	7.8	10.5	7.1	3.6
Assumed IL = 3 months	7.8	10.4	7.4	3.7

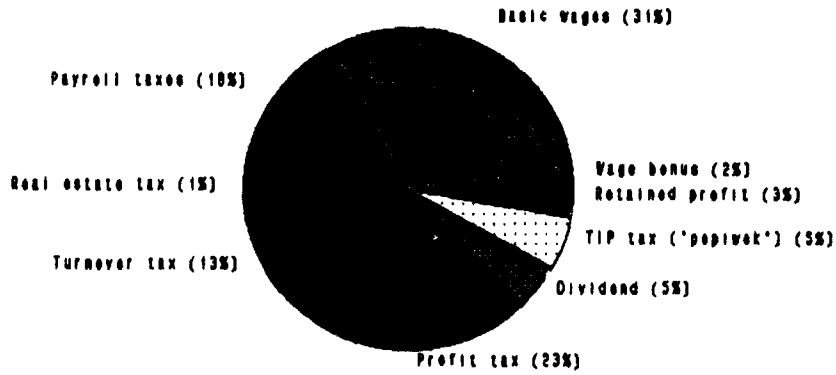
But the decline in the inflation bias had a further, indirect effect on profit tax revenues by allowing an increase in unit labor costs. Ceteris paribus, a decrease in the inflation bias increases net cash flow (cash flow after taxes paid out of profit). But ceteris is not paribus, and increased net cash flow meant more scope for wage increases. The improvement in net cash flow resulting from the decrease in the burden of inflation bias taxation could be transferred to workers in the form of wages. The increase in amortization allowances had a similar indirect effect.

11. Profit tax in 1989 is adjusted so that the inclusion of the popiwek in profit tax in that year alone is netted out.

Figures 2 and 3 reconstruct the division of the enterprise sector surplus for 1990 and 1991, respectively. The surplus is defined as wage income plus retained profit plus taxes.[12] It is, roughly speaking, value added, gross of depreciation and on a cash basis - funds available for payments to employees, taxes, and retained profit.[13] The charts show that labor's share of the surplus increased in 1991, but not at the expense of retained profit, which was very low in both 1990 and 1991. Rather, the increase in labor's share came at the expense of the state's share, in particular the portion arising from profit taxes.

Figure 2

1990



The impact of wage behavior can be formalized in the simplest of models in the following way. In 1990 and 1991 retained profit - cash flow after all taxes and wage bonuses - was near zero. Let us assume this is a behavioral relationship that describes wage movements: taking output, employment, etc. as exogenous, wages are set so as to drive net cash flow down to someconstant, which we take as zero (the comparative statics do not change if this constant takes other value).[14]

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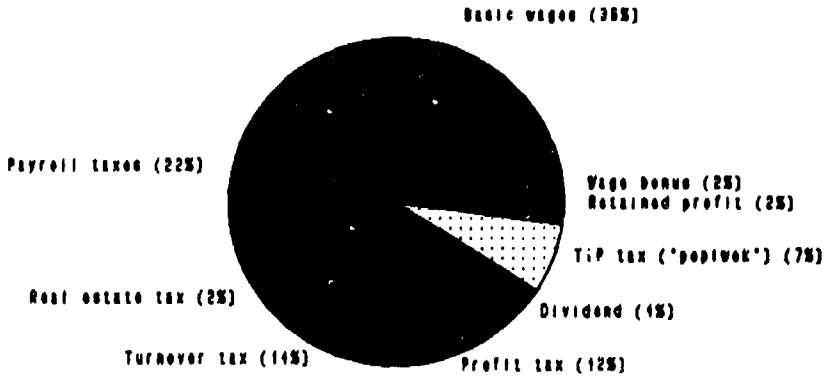
12. Retained profit is calculated as a residual (cash flow minus taxes out of profit minus estimated wage bonuses.)

13. I do not have figures for spending on in-kind payments to workers (e.g. the housing fund) for 1991, so this is not included in the definition of the surplus.

14. This is rather simple way of modelling the Polish enterprise as a "worker-controlled firm"; retained profit for investment is exogenous, workers are the residual claimant. For more on the nature of the Polish enterprise and the economic consequences see e.g. Calvo and Coricelli 1992, Berg and Blanchard 1992, Dąbrowski, Federowicz and Levitas 1992, Frydman and Wellisz 1991, Schaffer 1992.

Figure 3

1991



We have the following relationships (we ignore wage bonuses and, as before, we normalize by sales):

$$CF = HCA + A - IB - IA$$
$$RP = CF - PTAX - DIV - TIP$$
$$PTAX = t_1 HCA$$

where PTAX is profit tax, levied at a rate of t_1, RP is retained profit, DIV is the dividend tax, TIP is the tax-based incomes policy tax (the "popiwek"). Set RP=0, substitute and rearrange and we get the following expression for HCA profit:

$$HCA = \frac{1}{1-t_1}[IB+IA-A+DIV+TIP]$$

The average profit tax rate in 1990 was 37%. In 1991, a significant number of firms were lossmakers and so their marginal tax rate was zero. For our comparative statics exercise we take 30% as the marginal tax rate over 1990-91.[15] This gives us a value for the "multiplier" $1/(1-t_1)$ of 1.43.

Table 7 summarizes the direct and indirect impact of changes in the variables on enterprise profitability. The cumulative impact of 1990-91 changes in all the variables is a drop of 18% in HCA profitability, which is about what actually happened.[16] The changes in the inflation bias and in inventory accumulation cannot be separately identified very accurately, but this is not a problem with the cumulative

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15. Gross losses were between 1/4 and 1/3 of gross profits in 1991; gross losses were virtually nil in 1990. So we take as the marginal tax rate .5 * 37% + .5 * (1/3 * 0 + 2/3 * 37%) ≈ 30%.

16. This is not a coincidence, since our behavioral assumption of constant (small) retained profit was roughly what was actually observed.

effect (recall that IB+IA = HCA+A-CF). Most of the change in profitability is driven by the drop in the inflation bias and the increase in amortization allowances. Taking into account the indirect impact of wages we find that the full impact on Table 7 summarizes the direct and indirect impact of changes in the variables on enterprise profitability. The cumulative impact of 1990-91 changes in all the variables is a drop of 18% in HCA profitability, which is about what actually happened.[17] The changes in the inflation bias and amortization allowances alone would have been -15% and -18%. In other words, we can explain most or all of the 1991 collapse in profitability with these two factors alone, and with the inflation bias as the single most important factor. Conversely, the large inflation bias in 1990 was the key reason for that year's low unit labor costs and high CCA (as well as HCA) profits.

Table 7: Direct and Indirect Impact of Changes in Various Factors on Enterprise Sector profitability in 1990-91

All quantities are measured as a percentage of sales at producer prices.

ΔIB	-8 to -10	-9.7			
ΔIA	-2 to 0		-13.1		
ΔA	-3.5			-12.6	* 1.43 = 18
ΔDIV	-0.1				
ΔTIP	+0.8				

Identifying the impact on the government budget is somewhat more involved. Calculating the direct impact on profit tax revenue of the decline in the inflation bias and the increase in amortization allowances is simple (a loss in revenues of about 3-4% of GDP). However, wages are taxed, and so an upward movement in wages will both cause profit tax revenue to fall (the indirect impact on profit tax revenue) and wage tax revenue to rise.

Ignoring for the moment the popiwek, we can estimate the effect on tax revenues of a change in unit labor costs as follows. Let

t_1	=	tax rate on profits
t_2	=	(combined) payroll tax rates
R	=	total revenue from taxation of wages and profits
π	=	profits
w	=	wage

17. This is not a coincidence, since our behavioral assumption of constant (small) retained profit was roughly what was actually observed.

L = employment

Then

$$R = t_1\pi + t_2wL$$

A straightforward calculation shows that

$$dR = d(wL) * (t_2 - t_1t_2 - t_1)$$

An increase in wage costs will increase tax revenue if

$$(t_2 - t_1t_2 - t_1) > 0$$

i.e. if

$$t_2 > t_1/(1-t_1)$$

(The calculation is the same if we divide through by sales and talk about changes in terms of unit labor costs.)

In 1990 the effective profit tax rate was 37%, and so $t_1/(1-t_1)$ is about 0.59. This is about the same as the average combined payroll tax rates in 1990. Thus according to the above approximation, an increase in wage costs will, ceteris paribus, have little effect on total tax revenue. However, we have to take into account two additional factors.

- First, when the popiwek is binding, the marginal tax rate on wages is very high. In comparing 1990 with 1991 this is probably not very important. The TIP bit about as hard in 1991 as it did in 1990 - the ratio of TIP taxes to wage bills was about the same in both years (19-20%).

- Second, many enterprises were loss-making in 1991 (according to HCA profit) and therefore incurred no profit tax liabilities at all. The marginal profit tax rate for an enterprise that is loss-making is zero. An increase in wage costs in a loss-maker would therefore unambiguously increase tax revenue, since payroll tax obligations would increase and profit tax obligations would remain zero. For our comparative statics, we take (as before) $t_1=0.30$ in 1990-91, $t_2=0.59$ and we find that $dR = d(wL) * 0.11$

If we divide through by sales, we have the increase in tax revenue as a percentage of sales in terms of the change in unit labor costs. The result of this calculation is that the increase in unit labor costs in 1991 probably increased tax revenue by something like ½ of one percent of sales, or ½ of one percent of GDP, a not inconsiderable amount.

However, although the change in the division of the enterprise surplus in 1991 led to an increase in gross tax revenue, it had the opposite effect on the government budget surplus. The reason for this is the following. The tax revenue from these various taxes ends up in different places: the tax on wages and the profit tax go into the state budget, social security tax revenue goes to the state pension scheme, and labor fund tax revenue goes to a separate unemployment compensation fund. But pensions and

unemployment compensation are linked to the average wage, so that increased tax revenue resulting from increased wages is automatically offset by increased spending on these items.

We can calculate the size of these changes in distribution as follows. Consider what happens to the main government budget. The average wage tax rate is 19% (t_2=0.19); as before, t_1=0.30. In that case we have

$$dR = d(wL) * (-0.17)$$

So the effect on the main government budget, ceteris paribus, was an increase in the deficit amounting to something like 3/4 of one percent of GDP. In fact, the drain on the budget was somewhat larger than this. In 1990 the average pension was 54% of the average wage; in 1991 the pension/wage ratio increased to 59%, i.e. pensions rose even faster than wages. Furthermore, the number of pensioners is increasing (by 12% in 1991, to 7.9 million), the unemployment rate is increasing (from 6% in 1990 to 12% in 1991), and employment in the enterprise sector is decreasing (by about 10% in 1991, to about 6.8 million). In 1991 the budgetary subsidy the social insurance funds increased from 3.2% to 4.6% of GDP, i.e. by rather more than our estimate of the effect of the wage increase alone.

To summarize this section: with a simple model of wage behavior we can explain virtually the entire collapse in profitability in 1991 as the result of changes in the inflation bias (the single most important factor), and amortization allowances (plus some other minor factors). The government budget was affected in two ways. First, the decline in the inflation bias and the increase in amortization allowances caused profits and hence profit tax revenues to fall. The direct effect was a loss in revenue amounting to about 3-4% of GDP. Second, wages increased in response to the fall in profit tax liabilities. The effect of this increase in wages was an increase in government revenue, but this was more than offset by an increase in government spending via the indexation of social security expenditures to the wage. The cost to the budget was about 3/4 of one percent of GDP.

The total impact of all this on the government budget amounted to an increase in the deficit of about 4-5% of GDP. In fact, the general government balance (on a commitment basis) went from a surplus of 3.1% in 1990 to a deficit of 5.3% in 1991, so about one-half of the swing can be accounted for by the factors listed above.

VII. Forecasting Tax Revenues: What Went Wrong?

In the previous sections I have looked at the mechanics of how developments in enterprise finance contributed to the emergence of the Polish fiscal crisis. In this section I ask the question of whether mistakes in forecasting enterprise finance contributed to the crisis.

Table 8 presents forecasted vs. actual data for enterprise finance (some figures may differ slightly from those presented earlier because of small differences in coverage). The forecasts are those made by the Ministry of Finance when preparing the government budget.

The profit forecast for 1990 was too low, even though amortization deductions were higher than forecast. Basic HCA profitability (before amortization deductions) turned out to be almost 7 percentage

points higher than forecast. Unit labor costs were, however, forecast fairly accurately. The forecast error for 1990 therefore amounts to an underestimate of the inflation bias. It is difficult to criticize this error, however; not only is the inflation bias difficult to estimate even ex post, but inflation in 1990 was in fact higher than forecast.

The 1991 budget forecasted HCA profitability as the same as actual profitability the previous year (23.5% vs. 23.7%); the reality was quite different, as we have seen. The first point to note is that HCA profit gross of amortization allowances was actually predicted to increase in 1991 by about 3%, thus offsetting the increase in amortization allowances. Part of the forecasted increase was to come from a predicted decrease in unit labor costs, but most of it (about 2%) was to come from elsewhere.

Say that the forecast of 1991 unit labor costs had been correct (i.e. 16.8% instead of 22.6%). Then, ceteris paribus, actual profitability in 1991 would have been 12-13%, i.e. about 10-11% below the forecast. Also recall that above we estimated the fall in the inflation bias in 1991 as about 8-10% of sales. Thus most of the misforecast for profitability amounts to a failure to allow for a fall in the inflation bias.

Unlike the forecast error the previous year, the 1991 profit forecast can, in my view, be justifiably criticized as excessively optimistic. It assumed implicitly that the inflation bias would not fall, but at the same time inflation was predicted to fall. It also should have been clear from the past history of the enterprise sector that 20% + profit rates were an inflation-related anomaly. Profit rates prior to 1989 were a better guide to predicting enterprise profitability as high inflation rates moved into the past.

VIII. The Current Fiscal Crisis: Policy Options for Increasing Tax Revenues

The planned government balance for 1992, based on the 1992 budget, was a deficit amounting to 5% of GDP. It now appears that this target will be overshot, and the cumulative deficit for 1992 will be 8% of GDP or more. In this section I want to discuss some of the policy options available on the revenue side.

A. VAT and turnover tax

VAT will probably be introduced in mid-1993. It will replace the existing turnover tax. It seem clear that VAT should be aimed at raising more revenue that the turnover tax it replaces. Currently, the turnover tax liabilities (excluding taxes on alcohol, tobacco and petroleum products) of the enterprise sector amount to about 10% of enterprise sector surplus.[18] That is, VAT (excluding excise taxes on alcohol etc.) levelled at an average rate of 10% would raise about the same amount of revenue as the existing turnover tax. If we allow for zero-rating of VAT on exports (say 1/3 of value added), this would put VAT that simply replaced turnover tax revenues at an average rate of something like 15%.

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18. Calculated from 1991 data as follows (see also Figures 2-3). Total turnover tax revenues * 60% => appx. revenues excluding alcohol, tobacco, petroleum products. Enterprise sector surplus = basic wage bill + bonuses + payroll taxes + profit tax + dividend + TIP tax + retained profit + turnover tax + real estate tax.

Table 8: Enterprise Taxation and the Government Budget: Forecasts behind the Budget Laws vs. Actual Outcomes

	1990 Budget		1991 Budget	
	Forecast	Actual	Forecast	Actual
Profitability as a % of sales at producer prices	18.6	23.7	23.5	7.1
Profit tax as a % of sales at producer prices	6.1	8.5	9.2	4.5
Unit labor costs	16.9	18.1	16.8	22.6
Amortisation deductions as a % of sales at producer prices	1.9	3.4	6.8	6.8
Profitability before amortisation deductions as a % of sales at producer prices	20.5	27.1	30.3	13.9
Payroll taxes as a % of sales at producer prices	6.2	6.6	6.3	8.6
Profit + payroll taxes as a % of sales at producer prices	12.3	15.1	15.5	13.1

Notes: "Profit" = Historical cost profit ("financial result"). Coverage of the enterprise sector differs slightly from previous tables.

This is already close to European levels, but an average rate of 20% or more seems not unreasonable. Again allowing for exports, increasing the average VAT rate by 5% would raise revenues amounting to an additional 1-2 percent of GDP - a significant but not a huge amount. To compensate for the entire drop in the taxation of the inflation bias, by contrast, VAT would have to be introduced at an average rate of something like 30%, which is not practical.

A useful interim measure for the period until the introduction of VAT would be an increase in the existing turnover tax. This tax amounted to about 7% of sales in 1988-89 but fell to 5% in 1990 and increased only slightly in 1991 to 5.5%. The reasons for the fall in revenues are not clear; the tax take

from alcohol/tobacco/petroleum fell by about as much as the take from remaining goods. In any case a return to pre-1990 tax levels certainly seems feasible and could be implemented almost immediately. This would raise revenues by 1.5% to 2% of GDP. VAT could then be introduced at rates that would maintain this revenue.

B. Payroll taxes

In 1992, the wage tax was replaced with a personal income tax (PIT) and the social security tax rate was raised from 43% to 45%. Given the deficit being run by the state pension scheme, another increase in the social security tax rate would probably be easier to support politically than an increase in PIT and would straightforward to implement. An increase to 50% (both Hungary and the CSFR have similar rates) would raise revenue amounting to about 3/4 of one percent of GDP.

C. Profit tax

In my view it would be wise to keep an historical-cost based profit tax because it acts as an "automatic stabilizer". If the government fails to get control of the budget deficit and is forced to finance it using inflationary means, then taxation of the inflation bias will keep the deficit smaller than it would otherwise be. (Indeed, the budget was more or less in balance by the end of the 1989 inflation for just this reason.)

The importance of this automatic stabilizer can be considerable, as the following calculation demonstrates. Inventories in the enterprise sector amount to about 15% of GDP. Assuming a steady inflation rate of X% p.a. and an average profit tax rate of 33%, annual tax revenue from the inflation bias is about .05*X% of GDP (.33*.15*X), i.e. each time the inflation rate increases by 10%, tax revenues increase by about ½ of one percent of GDP. Inflation is currently running at about 30% p.a. If it increases to 70%, say, the increase in the inflation bias would (ceteris paribus) bring in an extra 2% of GDP in profit tax revenue.[19]

To increase profit tax revenue simply by raising the tax rate is not practical in the absence of other changes because the tax base is already eroded. An obvious alternative is to try to redress one of the mistakes of 1991, namely the indexing of amortization deductions. Inflation has already taken care of this to some extent (there was no major reindexation at the start of 1992, and nominal monthly deductions are about what they were in 1991), but there is still some scope for manoeuvre here.

A radical step would be to reduce drastically or even abolish entirely amortization deductions for state-owned enterprises for fixed capital acquired prior to 1990, i.e. before the start of the transition from socialism. When transition started, these enterprises became worker-controlled firms using capital which was inherited from the communist period. Since labor is now the residual claimant (and will be until

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19. For this to work, the stock of enterprise payables to the budget (back taxes) must be indexed to inflation as I believe is the case (unpaid taxes accumulate penalty interest linked to the going interest rate). In the absence of inflation-indexation, the loss of real revenue via the Tanzi effect would cancel the fiscal bonus from taxation of paper capital gains on inventories. (As of May 1992, the enterprise sector's stock of unpaid taxes to the stock was about 1/3 the stock of inventories, i.e. about the profit tax rate.) Of course, the government must also actually be successful in collecting the taxes.

privatization), it is peculiar that these firms are given a tax break on top of the free use of state-owned capital; if anything, they should be paying for the use of the capital.[20]

A different rationale for distinguishing between pre-1990 and post-1990 investment in the depreciation regulations,[21] and one that applies to private as well as state-owned firms, is that the book value of pre-1990 capital is not liable to be a good guide to their economic value, and one can readily argue that one can start a fundamental system change with a clean slate. Thus pre-1990 investment could be allowed to depreciate slowly, and/or less than 100% of the value of the capital could be deductible; post-1990 investment could be allowed to depreciate more quickly, and kept 100% deductible. The definition of "pre-1990" and "post-1990" would ideally be the purchase date of the capital and not when it was manufactured, because many new private firms purchase used equipment from state firms. Unfortunately, this would encourage (small and medium-sized) firms to maximize their deductions by reorganizing themselves into new firms, including selling their pre-1990 fixed capital to the new firm as part of the reorganization.

How much revenue would be raised by these changes would depend on the exact rule changes chosen, but a rough upper limit is simple to calculate. If all amortization allowances were simply removed, and the increase in profit were taxed at the average rate of 37%, revenue amounting to about 1.5% of GDP would be raised. Unless the government is willing to strongly discourage investment, the revenue raised by adjusting amortization allowances would be unlikely to exceed 1/2 of 1% of GDP.

To conclude: an increase in tax revenues from the enterprise sector seems practical, but could not alone solve the budget crisis. Additional revenues of 2-3% of GDP at most seem attainable. There is furthermore a medium- to long-term problem, namely that as the state sector stagnates/shrinks and the emerging private sector grows, the tax net will get leakier and leakier. There seems no alternative but for the government to try to get control of the social security portion of the budget, notably pensions. But this is beyond this scope of this paper.

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20. One possibility would be the following: (1) abolish the dividend tax and disallow amortization deductions for capital acquired for 1 January 1990; (2) make state-owned enterprises pay to the state a rental charge for state-owned fixed capital, i.e. fixed capital acquired before 1 January 1990; this rental charge would be deductible for profit tax purposes. The easiest way to do this would be to set the rental charge as (some or all of) the amount of capital amortized. This would amount to making enterprises pay their amortization deductions on pre-1990 fixed capital to the state, and continuing to deduct them from taxable profit. But the political obstacles to implementing this scheme are probably insurmountable.

21. I understand this is already happening.

APPENDIX 1:

THE RELATIONSHIP BETWEEN HISTORICAL COST PROFIT, CASH FLOW AND INVENTORIES: A SERIES OF EXAMPLES

In this appendix, I present a series of simple examples of how historical cost profit, net cash flow from current operations, and inventories valued at historical cost (purchase prices) are related.

The basic data are presented in Table A.1. To make things easier, we make a number of simplifying assumptions.

There are no costs other than material costs.

There are no amortization deductions.

The firm holds inventories of materials only. There are no inventories of finished goods/work-in-progress. Everything that is produced is sold.

Inventories are valued at purchase price.

The firm is operating in an inflationary environment, as is evidenced by the purchase prices for the materials it holds: one unit was purchased at a price of 10, one unit at a price of 20, and the price this period is 30.

In the example, the firm holds the same number of physical units (2) of materials at the start and the end of the period. Real inventory accumulation is zero. As we shall see, nominal inventory accumulation will depend on precisely how the firm does its accounting.

The firm has three different options for how it calculates historical cost profit and the value of the closing stock of inventories. The three options correspond to the three different prices it has paid for the materials it held: 10, 20 or 30. The lower the price chosen for materials used in production, the larger the historical cost profit for the period, and the larger the figure for nominal inventory accumulation. The examples show that no matter which of the three options is chosen, the basic accounting identity still holds:

Net cash flow from current operations = historical cost profit - nominal inventory accumulation

(Recall we have assumed no depreciation.) The intuition is that if the price of materials used in the HCA profit calculation is low, HCA profit is high but so is inventory accumulation. These two effects cancel in the accounting identity.

The fourth example shows what happens if inventories are revalued during the current period. Here, total HCA profit contains an inflation bias since the capital gains resulting from the inventory revaluation are counted as profits (this is the Polish practice). Indeed, the inflation bias in total HCA profit is largest when inventories are revalued because all the paper capital gains are realized at once. But again, this inflation bias is also captured in nominal inventory accumulation, and the accounting identity, when applied to total HCA profit, will yield the correct figure for cash flow.

TABLE A.1:

THE RELATIONSHIP BETWEEN HISTORICAL COST PROFIT, CASH FLOW, AND INVENTORIES: A SERIES OF EXAMPLES

	Quantity	Price	Value
Basic Accounting Information			
Stock of materials on 1.1			
	1	10	10
	1	20	20
Total:	2		30
Units produced and sold	1	40	40
Materials consumed in production	1		
Materials purchased	1	30	30
Calculation of Net Cash Flow from Current Operations			
Cash flow = sales - purchases of materials			40-30 = 10
Calculation of HCA Profit			
Accounting Option 1:			
Materials consumed in production	1	10	10
HCA profit = sales - cost of materials used in producing the units sold			40-10 = 30
Stock of materials on 31.12			
	1	20	20
	1	30	30
Total:	2		50
Inventory accumulation, 1.1-31.12			50-30 = 20
Accounting identity: cash flow = HCA profit-inventory accumulation			30-20 = 10

Table A.1 (continued)

	Quantity	Price	Value
Accounting Option 2:			
Materials consumed in production	1	20	20
HCA profit = sales - cost of materials used in producing the units sold			40-20 = 20
Stock of materials on 31.12			
	1	10	10
	1	30	30
Total:	2		40
Inventory accumulation, 1.1-31.12			40-30 = 10
Accounting identity: cash flow = HCA profit-inventory accumulation			20-10 = 10
Accounting Option 3:			
Materials consumed in production	3	30	30
HCA profit = sales - cost of materials used in producing the units sold			40-30 = 10
Stock of materials on 31.12			
	1	10	10
	1	20	20
Total:	2		30
Inventory accumulation, 1.1-31.12			40-30 = 0
Accounting identity: cash flow = HCA profit-inventory accumulation			10-0 = 10

Table A.1 (continued)

	Quantity	Price	Value
Accounting Option 4: Inventory Revaluation			
Stock of materials on 1.1 following revaluation			
	1	30	30
	1	30	30
Total:	2		60
Extraordinary profits from inventory revaluation			60-30 = 30
Materials consumed in production	1	30	30
HCA profit from sales = sales - cost of materials used			40-30 = 10
Total HCA profit = profit from sales + extraordinary profits			10+30 = 40
Stock of materials on 31.12			
	1	30	30
	1	30	30
Total:	2		60
Inventory accumulation, 1.1-31.12			60-30 = 30
Accounting identity: cash flow = HCA profit-inventory accumulation			40-30 = 10

APPENDIX 2:

INVENTORIES AND THE INFLATION BIAS IN THE POLISH ENTERPRISE SECTOR

Polish enterprises report monthly on their inventories. Inventories are divided into four categories: (1) materials; (2) work-in-progress (WIP); (3) finished goods; (4) "commodities" ("towary"). The difference between finished goods and "commodities" depends on the reporting unit and not on the nature of the goods. An enterprise holding inventories of goods which it has produced itself reports these goods as "finished goods"; an enterprise holding inventories of finished goods which it purchased complete and will resell reports these goods as "commodities".

This distinction between goods produced and goods marketed is also made in the output statistics. The definition of "sales of own production" includes sales of finished goods valued at their sales price, and commodities valued by their profit margin (the difference between the purchase price and the sales price). This is particularly important for the retail trade sector, where most sales are of commodities and hence "sales of own production" is something like 1/6 of total turnover. Figures on total turnover in the enterprise sector began to be published only in 1991. For 1991 as a whole, total turnover was 46% greater than "sales of own production".[22]

Inventories are valued at "cost". Materials and commodities are valued at their purchase price. Finished goods and work-in-progress are valued at their (historical) cost of production. The valuation of finished goods and WIP does not include certain general costs which are not attributed to specific production activities (notably depreciation of fixed capital). In 1988-91, the value of inventories in the enterprise sector typically broke down as follows: finished goods, 5-15%; commodities, 25-40%; materials, 40-55%; work-in-progress, 10-20%.

The most direct way to estimate the average life in inventory is to calculate the ratio of the value of inventories at sales prices to turnover. We do this as follows:

Materials: we add in approximate valued added to get the total value of the sold products that will embody them.[23]

Finished goods and commodities: we add in missing costs and a profit margin to get to value at sales prices.

WIP: I assume simply that the value added to a unit of WIP lies half-way between the value added to a unit of materials and a unit added to finished goods and commodities.

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22. "Total turnover" is calculated as total income less financial income and subsidies. Data from Biuletyn Statystyczny, No. 2, 1992, p. 47.

23. Why this is necessary can be seen from an example (with no inflation). Consider an enterprise which in a steady state purchases one zloty of materials and sells 10 zloty of final good each period. It holds the materials for 5 periods, adds 9 zloty of value (labor) in the 6th period, and then sells it at cost. In the steady state it will hold 15 zloty of inventories: 5 zloty of materials and 10 zloty of finished goods. To get the average life of inventories we gross up the value of inventories of materials (5 zloty of materials will yield 50 zloty of final goods), add the value of finished goods (10), and divide by turnover per period (10 zloty). $60 \div 10 = 6$ periods, the correct answer for inventory life.

Finally, we divide the total of gross-up inventories by monthly turnover to get inventory life in months. Monthly turnover is approximated from monthly sales of own production plus 46% (see above).

Two methods of grossing up are used. (1) Materials are grossed-up by the ratio of monthly material costs to monthly sales of own production. Finished goods and commodities are gross up by the ratio of "monthly costs of own sales" to monthly sales of own production. This method will tend to overstate somewhat gross-up inventories because of the downward bias in historical costs.[24] (2) Materials are grossed-up by the ratio of monthly material expenditures (i.e. spending on materials on a CF basis) to monthly sales of own production.[25] Finished goods and commodities are grossed-up by 15% to allow for missing costs and a profit margin. This method will tend to understate somewhat gross-up inventories because of the inflation bias in inventories.

The results, on a month-by-month basis for 1989-90, are shown in. Inventory life is seen to be between 1.5 and 3 months, with estimates near the lower end of the range at the end of 1989 (the critical point estimate). NB: I do not think the estimates are accurate enough to be able to learn much from interpretations of month-to-month movements.

A check on this estimate is to calculate the implicit inventory life from the estimated inflation biases and observed costs. The idea is most clearly expressed if we consider the steady state (constant output, costs and inventories). In the steady state, inventories = αC, where α is the inventory life. Furthermore, the paper capital gain on inventories (the inflation bias) is just the inflation rate times inventories, and so

$$IB = \alpha C * p$$

This equation, together with the estimates of the inflation bias, can be used to calculate the implied life in inventories. The results are variable but are generally one month or less. I conclude that the estimated life in inventory in the Polish enterprise sector is 1-3 months.

Inventory price deflators are constructed from weighted averages of the industrial price index. The weights are calculated using a rough estimate of the distribution over time of value added in inventories. These are derived as follows. The ratio of total value to the value of materials in finished goods is about 2 (i.e. it takes one złoty of materials and one złoty of value added to make 2 złoty of finished goods). Reported inventories of materials are roughly equal to reported inventories of finished goods and commodities. Consider now a simple example. Life in inventory is 3 periods. Production is instantaneous. One złoty of materials is held for 2 periods, one złoty of value is then added in production, the resulting finished good is held for one more period and then sold. In a steady state with no inflation, inventories will be 2 złoty of materials + 2 złoty of finished goods = 4 złoty. (Note that both the shares of materials and finished goods in total inventories and the ratio of materials to value

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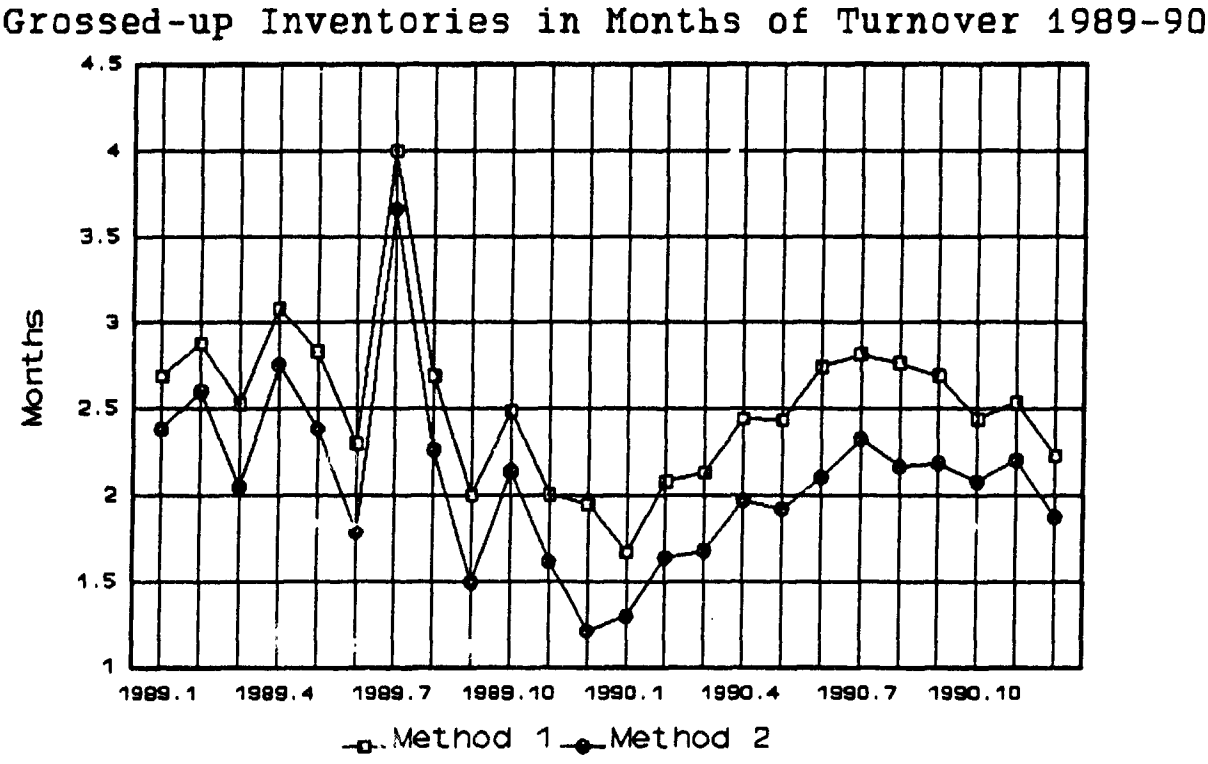
24. Both inventories and costs are biased downwards, but (assuming LIFO) the bias is greater for costs because the costs of sold production reflect the full time spent in production (inventory life).

25. Material expenditures are calculated using an identity similar to the CF identity (see Schaffer 1992). There is a residual inflation bias remaining in this estimate of material expenditures, but it is likely to be small.

added in finished goods are what we typically observe.) For simplicity, assume that the price indexes available are period-average indexes. A weighted price index should therefore be

$$I_t = (p_{t-2} + p_{t-1} + p_t + p_t) / 4$$
$$= (p_{t-2} + p_{t-1} + 2p_t) / 4$$

Figure A2.1



Period t is weighted more heavily because of the value added in that period.

To implement this, I weight the price level in the last 1/3 of the time in inventory double the weight of the price level in the first 2/3 of the time in inventory. The price index used is the industrial sales price index, an end-month index. To get the average price level for the first 2/3 and the last 1/3 of time in inventory I assume a straight-line increase in the price level. The inventory price indexes are calculated as { (average price level in the first 2/3 of time in inventory) + 2*(average price level in the last 1/3 of time in inventory) } ÷ 3.

Three separate indexes are calculated, corresponding to inventory lives of one month, two months, and three months. These price indexes are applied to the inventory series to get a time series for real inventories in constant prices. Real inventories are used to calculate monthly real inventory accumulation in constant prices; this is converted into current prices using the industrial price index to get monthly real inventory accumulation in the prices of that month. Monthly inventory accumulation is then summed to get annual inventory accumulation. The resulting estimate of "real annual inventory accumulation in current year prices" is little changed if instead we calculated real annual inventory accumulation and converted this into current year prices using an annual average price deflator.

Berg and Sachs (1992) have argued that inventory accumulation may be biased downwards by ownership transformation, particularly in retail trade. Old firms close down, their inventories transferred to new firms, and the new firms may not have been caught in the statistical reporting net. This is not a problem for the derivation of the inflation bias, however, so long as the liquidation of inventories is reflected in the profit/loss accounts of enterprises.[26]

Finally we use the identity

$$IB = HCA + A - CF - IA$$

to calculate the inflation bias.

The reason for preferring this method to calculate the inflation bias is because the variability in the magnitudes of the estimates of inventory accumulation is small compared to the magnitudes of the other variables (i.e. IB + IA is a big number compared to the variation in the estimates of IA).

A rough check on the reasonableness of the inflation bias estimates is as follows. Inventories in 1991 were about 15% of annual sales. Inflation was fairly steady during the year, and December-December industrial price inflation was 36%. Capital gains on inventories should therefore have amounted to about 5-6% of annual sales, which is just our estimate for the inflation bias in 1991. This approximation also works well for 1988, but less so for 1989 and 1990, when inflation was high and variable and inventories were de-cumulating; the resulting approximations of the inflation bias are considerably higher than those calculated using the main method presented above.

A shortcut calculation of the inflation bias in period t can be had simply by indexing costs for inflation:

$$IB_t = \frac{p_t}{p_{t-N}} C_t$$

where p_t is the price level at time t and N is the average age of inventories, which we approximate as just one-half an assumed average inventory life. If we do this for a variety of choices of inventory life we find that for an inventory life of one month the estimate of the inflation bias is close to those calculated above for all years; an assumed inventory life of 2 months or more gives impossibly high figures for the inflation bias in 1989 and 1990.

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26. Interestingly, in the most affected year (1990), the figures for inventories held on 1 January reported monthly by enterprises in socialized retail trade actually increased slightly in the course of the year. The statistical net apparently caught more (or larger) socialized retail trade enterprises as the year progressed.

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